

Title: MailboxCam Instantaneous Remote Mail Viewing System

[0001] Cross-Reference to Related Applications

This application is entitled to the benefit and filing date of Provisional Patent Application 60/412,913 filed September 23, 2002. Applicant claims priority to provisional patent application 60/412,913 filed 9/23/2002 pursuant to 35 USC paragraph 119e (i).

[0002]Field of the Invention

This invention relates to checking the presence of mail in a mailbox at a distance. In particular this invention relates to an apparatus and method to view the presence or absence of mail in a mailbox remotely and instantaneously.

[0003]Background—Description of the Prior Art

It can be difficult to check the mailbox for mail in some situations. Some mailboxes are located a long distance from the residence, requiring driving or a long walk to reach the mailbox. Other mailboxes are closer but are difficult to reach during inclement weather such as cold, rain or snowstorms. Many inventors have attempted to solve this problem with varying success. Some of the inventions rely on a mechanical device that must be visible from the home to be accessible. While these devices may show that the mail has arrived, they may not be visible due to weather, poor visibility or terrain obstructions. Other inventors have attempted to solve the problem electronically by using sensors combined with radio transceivers to sense the arrival of mail and send the information to

data receiving devices such as a personal computer. Many of these devices are but electronic versions of earlier mechanical inventions and replace the line of sight problems with battery drain issues and inaccurate mail status information. In particular, patent number 5,023,595 to Bennett, uses a door position switch along with a radio transmitter to communicate to the user if the mailbox door has been opened or not. The problem with this approach is that while it does communicate whether the door has been opened it cannot tell the user if mail has been placed in the mailbox. There are many instances where mail is left in the mailbox to be picked up by the U.S. Postal Service. The Bennett invention would only tell that the door on the mailbox has been opened and it must be assumed that the mail has been picked up. It does not include a way to verify that the mail has indeed been picked up or if other mail was delivered and left in the mailbox.

[0004]U.S. patent 5,239,305 to Murphy et al, describes a device that senses the opening of the mailbox door and transmits the information to the user. It does not tell the user if the mail was removed, if new mail was delivered or if a prankster or someone with ill intent has placed a potentially hazardous object in the mailbox. Other inventions that have these same flaws are U.S. patents 5,377,906, 6,433,684, 6,114,959 and 4,872,210. None of these inventions can verify that mail was removed and replaced with delivered mail, identify the object placed in the mailbox, or that mail was removed and the mailbox left empty.

[0005]Others inventions require the use of cell phones, personal computers or data handling and storage devices to retrieve the information about the contents of a mailbox. These inventions are unreasonably complex, use large amounts of power and can be costly to produce. U.S. patent application number 2002/0103868 to Kahn describes a complex system that requires a computer system to be able to check the presence or absence of mail. Not only is this system costly to build but it is difficult to operate due to its complexity. It is impractical for a single mailbox since it is inordinately expensive to manufacture. The Kahn application does not give any method to identify potential suspicious objects in the mailbox that may contain dangerous materials, a serious flaw.

[0006]U.S. patent application number 2002/0024438 to Roberson also uses a data handling system that is unnecessarily complex and difficult to install for a single mailbox. This invention requires the added equipment of a mailbox control unit to store the information and some type of remote access device to retrieve the stored information. This invention describes the optional installation of a digital video camera to transmit a digital image to the mailbox control unit for information storage. The inclusion of the digital video camera allows viewing of the contents of the mail only in locations where the digital camera and transmission of data does not create an excessive power drain. Remote, single mailbox locations usually do not have the necessary power source at the mailbox itself and necessitate running a separate a power line to the mailbox.

[0007]While the Roberson application solves some problems it creates others that make it impractical in remote single-mailbox locations. The digital image must be transmitted at great power consumption and stored in a remote memory storage device. This data is then accessed remotely by using a cell phone or by computer access over the world wide web. The excessive power drain required to transmit the digital image and the long transmission time make this impractical for locations that do not have a connection to a permanent power source. This system is not instantaneous, requires the transmission of data to a storage device and remote access of the stored data using special equipment all showing the obvious disadvantages of the invention.

[0008]It is the object of this invention to create a device that has minimal power consumption using equipment that transmits an analog instantaneous image of the contents of the mailbox to the user on demand. The instantaneous image is only visible while the user maintains the operation of the unit by pressing a momentary contact switch insuring the power drain is minimal. After the user releases the switch, the device will enter an extremely low power wait mode until next accessed. The device is mounted inside the mailbox, is self-contained and does not require any power source other than batteries or optionally a solar charger to extend the battery life even longer.

[0009]The present invention will allow the user to instantaneously check the interior of the mailbox remotely, to see if mail has been picked up and/or if new mail delivered. It also eliminates the potential risk to the user from acts of foul play or terrorism involving dangerous articles placed in the mailbox such as a pipe bomb. While these acts of terrorism are rare, they have occurred in the past and occur most often in rural or remote locations where the terrorist cannot be seen while placing the object in the mailbox.

Summary of the Invention

[0010]The present invention of the instantaneous remote mail viewing system comprises an instantaneous analog video transmission device normally in standby, low power mode normally mounted inside a mailbox, an analog video receiver and a transmitter that activates the analog video transmission only as needed by the user.

Objects and Advantages

[0011] Accordingly, besides the objects and advantages of the instantaneous remote mail viewing system described in the above patent, several objects and advantages of the present invention are:

- (a) to provide a device that can view the contents of a mailbox in real time from a remote location;
- (b) to provide a device with low power drain and long battery life that can view the contents of a mailbox from a remote location;
- (c) to provide a device that can view the contents of a mailbox from a remote location and transmit that information to a television or other video imaging device instantaneously;
- (d) to provide a device that can view the contents of a mailbox in real time from a remote location that can be operated in a very low power standby mode while

waiting for a remote transmit signal.

- (e) to provide a device that can view the contents of a mailbox in real time from a remote location that has a minimum of components and can be installed quickly with a minimum of time.

[0012] Still further objects and advantages will become apparent from a consideration of the ensuing description and drawings.

Brief Description of the Drawings

[0013] In the drawings, closely related figures have the same number but different alphabetic suffixes.

Figures 1A and 1B show the preferred mounting locations for the low power drain, instantaneous image transmission device and solar cells.

Figure 2 shows the preferred assembly of the individual components for the low power-drain, instantaneous image transmission device.

Figure 3 shows the attachment of the video image receiver, attachment to the television set and the optional control switch.

Figure 4 shows how radio frequency transmissions are transmitted and received from the control switch, analog video image receiver and instantaneous image transmission device.

Figures 5A, 5B and 5C show preferred and optional wiring diagrams for the instantaneous image transmission device and solar cells.

[0014] A preferred embodiment of the placement and installation of the present invention

in the mailbox 10 is illustrated in Figure 1A and Figure 1B. Figure 1A shows the instantaneous image transmission device 12 mounted in the back 42 of mailbox 10. The device 12 located in the mailbox back 42 insures that multiple pieces of mail 41 can be viewed without any piece of mail covering another.

[0015]The antennae for remote RF receiver/controller 22 and the antennae for analog camera transmitter 24 can be routed through hole 40 in mailbox 10 for maximum transmission capability. In an alternate embodiment, both may be left loose to hang as space permits and do not need access hole 40 in mailbox 10.

[0016]The wires 30 connect instantaneous image transmission device 12 to the solar cell 14 in Figure 1B. The connection of solar cell 14 may require drilling hole 40 in the bottom of the mailbox 10 if it does not have vent holes present in the mailbox. The preferred embodiment of solar cell 14 is a low power trickle-charge diode unit that will charge during sunlight exposure but not discharge during low light conditions.

[0017]The preferred embodiment of the detailed construction of instantaneous image transmission device 12 is shown in Figure 2. The components of the device 12 can be mounted on the plastic mounting board 28. Mounting board 28 could also be an electronic circuit board as are well known in the arts but the plastic board lowers the risk of electrical shorts due to moisture condensation. A circuit board as a mounting board is an acceptable alternative construction. The battery power pack 16, the analog video camera 18 and RF transmitter 18, the remote RF receiver/controller 20, and the light source 26 can be mounted to mounting 28 board with adhesives or potting compounds. There are many other methods to mount components to boards.

[0018]In the preferred embodiment, battery power pack 16 can be wired in parallel with remote RF receiver/controller 20 and solar cell connecting wires 30. Battery pack 16 is preferred to be a 12 volt nickel-cadmium battery but other voltages and types of batteries may be used. The preferred analog video camera and RF transmitter 18 is miniature, a

low power, color, CMOS unit. Black and white CMOS units may also be used. The preferred analog video camera and RF transmitter **18** operates on a standard transmission frequency of 900 to 1200 MHz, with a voltage range of 6 to 12 volts at a power output of 50 to 200 mw. The preferred analog video camera and RF transmitter **18** can operate at a minimum illumination of 3 LUX.

[0019]The preferred remote RF receiver/controller **20** and the matching remote RF transmitter **38** both contain a built in decoder/encoder respectively. The built in encoder/decoder circuitry allows the user to setup unique combinations for isolated operation within close proximity to other units. The transmitter/receiver pair for the controller operates on separate transmission and receiving frequencies to avoid radio interference but may also operate on the same frequency or can be tuned to a specific individual frequency in an alternate embodiment. Remote RF receiver/controller **20** is well know in the radio controlled toy art and often used to operate radio controlled cars or other toys. These units operate in a low power standby mode while waiting for a signal. The negative power connection (ground) of the analog video camera and RF transmitter **18** is connected to the ground on remote RF receiver/controller **20**. Analog video camera and RF transmitter **18** is wired in series with the light source **26**. Light source **26** can be an LED light in the preferred embodiment but can also be made from halogen, incandescent or other types of light sources. The RF receiver/transmitter antennae **22** and the analog video camera antennae **24** are optimally fed through hole **40** in mailbox **10** to the outside and may be allowed to remain free and hang from the mounting board inside mailbox **10**.

[0020]The entire device **12** can be enclosed in a clear plastic cover, plastic films, potting compounds or other materials to protect it from moisture.

[0021] In Figure 3, RF receiver **36** is used to receive transmissions from instantaneous image transmission device **12** and converting information from the transmissions into a usable format and sending through the cable **34** to the television or video monitor **32**.

Battery powered RF transmitter **38** has a momentary contact switch **39** or toggle switch or other type of momentary contact switch to turn on RF transmitter **38** to transmit the power –on- command to the instantaneous image transmission device **12**. In an alternate embodiment, a battery-powered transmitter **38** can be incorporated into receiver **36** by adding a radio transmitter and power switch.

[0022]Figure 4 shows the preferred embodiment of the radio transmissions between the RF receiver **36**, analog video transmission device **12**, and battery powered RF transmitter, **38**. Battery-powered RF transmitter **38** is turned on by pressing and holding contact switch **39** which sends a radio –on- signal to analog video transmission device **12**, turning it on. Analog video transmission device **12** then transmits a real time image to RF receiver **36** and then to television **32** or alternately a video monitor.

[0023]The preferred wiring embodiment for analog video transmission device **12** is depicted in Figure 5A. Analog video camera/transmitter **18** is connected in series with light source **26** and then to remote RF receiver/controller **20**.

[0024]An alternate wiring diagram is depicted in Figure 5B. Analog video camera/transmitter **18** is connected in parallel with light source **26** and then to remote RF receiver/controller **20**.

[0025]Figure 5C depicts the wiring diagram of solar cell **14**, where solar cell **14** is attached directly to battery pack **16**.

[0026]From the description above several advantages of the instantaneous remote mail viewing system become apparent:

- (a) The instant invention provides the user the ability to view the contents **41** of a mailbox **10** in real time eliminating the need to travel to the mailbox **10** to examine the contents **41** or lack thereof.

- (b) The device **8** allows the user to check for potentially hazardous or dangerous devices that may be present in the mailbox **10** from a safe distance without the need to actually approach or open the mailbox **10**.
- (c) The invention allows the user to examine the contents **41** of the mailbox **10** remotely with a minimal of equipment or added electronic systems. It can be attached directly to the mailbox **10** and a television **32** and does not require computers or other types of expensive digital devices to access the image of the mail in the mailbox **10**.
- (d) The device **8** has a low power drain that insures long battery life and increases the length of time between battery replacement intervals.
- (e) The device **8** can be powered by both a battery power pack **16** and solar cell **14** to increase the battery replacement interval to the life of the unit

[0027]The Mailboxcam instantaneous remote mail viewing system **8** is normally in standby mode. Remote RF receiver/controller **20** in Figure 2 is normally in standby/low power consumption mode waiting for a RF signal to activate the unit. The user turns the power on for television **32** and receiver for analog transmission **36** in Figure 4. The user activates power button **39** on battery powered transmitter **38**. Battery powered transmitter **38** then sends a radio frequency signal to instantaneous image transmission device **12** as shown in Figure 4. Instantaneous image transmission device **12** goes from low power-standby mode to transmit power-on mode and transmits an instantaneous analog image of the interior of mailbox **10** to RF receiver **36** as shown in Figure 4. RF receiver **36** sends the signal to television **32** for viewing by the user. When the user releases power button **39**, the RF transmission stops and instantaneous image transmission device **12** goes from transmit power-on mode to low power, standby mode and the image stops.

[0028]Figure 2 shows the details of instantaneous image transmission device **12**. Instantaneous image transmission device **12** is normally in low power consumption-

standby mode and only remote RF receiver/controller **20** is active. When remote RF receiver/controller **20** receives a radio signal it activates an internal circuit that powers light source **26** and analog video camera /transmitter **18**. Analog video camera /transmitter **18** converts the image to a radio frequency transmission and transmits it through antennae **24**.

[0029]Figure 5A shows the preferred wiring method for remote RF receiver/controller **20**, light source **26** and analog video camera/transmitter **18**. In the preferred embodiment, light source **26** and analog video camera/transmitter **18** are wired in series and then connected to remote RF receiver/controller **20**.

[0030]Figure 5B shows an alternate wiring method for remote RF receiver/controller **20**, light source **26** and analog video camera/transmitter **18**. In an alternate embodiment, light source **26** and analog video camera/transmitter **18** are wired in parallel and then connected to remote RF receiver/controller **20**.

[0031] Figure 5C shows the preferred embodiment to extend the life of battery power source **16**. A solar cell **14** is wired directly to charge battery power source **16** during periods of sunlight, increasing battery life. It is preferred that solar cell **14** be of the type with a built in diode circuit to eliminate power loss during times of low sunlight.

[0032]The Mailboxcam Instantaneous Remote Mail Viewing System **8** makes it possible to view the contents of a mailbox **10** in real time, instantaneously, without the need for data acquisition devices or computers. The simple system **8** has a low power drain in standby mode and only uses power while transmitting for short periods of time. The system **8** makes it possible to not only tell if mail has been removed but also if new mail has been delivered and what type of mail is present.

[0033]The Mailboxcam Instantaneous Remote Mail Viewing System **8** significantly lowers the risk of vandalism or terrorism since the user can view the inside of the

mailbox **10** without opening it. Any illegal material such as a pipe bomb can be viewed without opening the mailbox **10** and exposing the user to serious risk of injury.

Furthermore the Mailboxcam Instantaneous Remote Mail Viewing System **8** has the additional advantages in that;

the type of mail **41** can be examined without opening the mailbox **10**, insuring that a needless trip to the mailbox **10** is not made to check on mail waiting to be picked up;

the system **8** uses a minimum of components and does not need computers or other digital equipment to operate;

the size of image transmission device **12** is small and can easily fit in any mailbox **10** and is easy to mount in the mailbox **10**;

image transmission device **12** in the mailbox **10** can be solar charged making the battery power last for years;

image transmission device **12** in the mailbox **10** is completely self-contained and does not need any additional power source or wiring;

the system **8** transmits and receives on different frequencies increasing the system's **8** reliability and eliminating false transmission signals and interference.

[0034]Although the description above contains many specific details, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of the invention. For example, the remote RF receiver/controller **20** described in the specification can be manufactured on a lithographed circuit board significantly decreasing the size of the component and lowering the power drain even further. The remote RF receiver/controller **20** can be

encased in a plastic housing with a clear front for operation of the video camera but it can also be encased in a potting compound such as urethane.

[0035]Many different battery power sources can be used such as alkaline, nickel cadmium, lithium ion and others. The term battery power pack is meant to include all battery systems known in the state of the art. Similarly there are many different types of RF receivers/controllers, RF transmitters and RF receivers with video transmission capabilities that are known in the state of the art that operate on different frequencies. Also the term light source can include incandescent, quartz, LED, fluorescent and other types of light as are known in the state of the art.

[0036]Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.